

REGULATION 8
ORGANIC COMPOUNDS
RULE 20
GRAPHIC ARTS PRINTING AND COATING OPERATIONS

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REGULATION 8
ORGANIC COMPOUNDS
RULE 20
GRAPHIC ARTS PRINTING AND COATING OPERATIONS

(Adopted April 12, 1980)

8-20-100 GENERAL

8-20-101 Description: The purpose of this Rule is to limit the emission of volatile organic compounds from graphic arts operations and graphic arts lines. Any operation which is determined to be exempt from the provisions of this Rule shall be subject to the provisions of Rule 4, if not already subject to another rule of Regulation 8.

(Amended December 4, 1985; October 6, 1993)

8-20-110 Exemption, Small User: ~~Until January 1, 1995, the requirements of this Rule shall not apply to any facility which conducts graphic arts operations which emits less than 13.6 kilograms (30 pounds) of VOC per operating day from graphic arts operation (calculations shall not include surface preparation or cleanup solvent).~~ Effective January 1, 1995 ~~Until July 1, 1999, the requirements of this Rule shall not apply to any facility which emits less than 182 kilograms (400 pounds) of VOC in any month from graphic arts operations, including surface preparation and cleanup solvent, provided the requirements of Section 8-20-507 are met.~~ Effective July 1, 1999, the requirements of this Rule shall not apply to any facility which emits less than 79.4 kilograms (175 pounds) of VOC in any month from graphic arts operations, including surface preparation and cleanup solvent, provided the requirements of Section 8-20-507 are met. For the purpose of calculating exemption applicability, emissions of volatile organic compounds from the use of non-heatset lithographic ink as determined by Section 8-20-601 shall be reduced by 95 percent.

(Amended April 19, 1989; October 6, 1993)

8-20-111 Exemption, Laboratory and Experimental Operations: The requirements of this Rule, except as provided in Section 8-20-503, shall not apply to equipment used exclusively for research, laboratory analysis or determination of product quality and commercial acceptance, provided emissions of VOC from such equipment do not exceed 136 kilograms (300 pounds) per month per facility.

(Amended April 19, 1989; October 6, 1993)

8-20-112 Deleted April 19, 1989

8-20-113 Deleted April 19, 1989

8-20-114 Deleted April 19, 1989

8-20-115 Deleted April 19, 1989

8-20-116 Exemption, Circuitry Printing: The requirements of this Rule shall not apply to the printing of circuit boards. (Adopted April 19, 1989)

8-20-117 Exemption, Heat Shrinkable Tubing: The requirements of this Rule shall not apply to the printing of heat shrinkable tubing. (Adopted October 6, 1993)

8-20-118 Limited Exemption, Water Slide Decals: The requirements of this Rule, except as provided in Section 8-20-503, shall not apply to the screen printing of water slide decals. (Adopted October 6, 1993)

8-20-119 Exemption, Prohibition of Sale: The requirements of Section 8-20-321 shall not apply to the following:

119.1 Ink, fountain solutions, and cleaning products shipped, supplied or sold to persons outside the District for use outside the District.

119.2 Ink, fountain solution, and cleaning products sold to any person who complies with the requirements of Sections 8-20-304 or 8-20-308.

119.3 Any manufacturer of ink, fountain solution, and cleaning products, provided the manufacturer has provided the maximum VOC content and category information for the product and the product was not sold directly to a user or a sales outlet located in the District, or the product was sold to an independent distributor located in the District that is not a subsidiary of, or under the direct control of the manufacturer.

119.4 Ink, fountain solutions, and cleaning products sold to any person who is exempt by Section 8-20-110.

8-20-200 DEFINITIONS

8-20-201 Approved Emission Control System: A system for reducing emissions of VOC to the atmosphere, consisting of a control device and a collection system, which achieves the overall abatement efficiency specified in the applicable standards section at all times during operation of the equipment being controlled.

(Amended April 19, 1989; October 6, 1993)

8-20-202 Flexographic Printing: The application of words, designs or pictures by roll printing technique in which the pattern to be applied is raised above the printing roll and the image carrier is made of rubber or other elastomeric material.

8-20-203 Fugitive Emissions: Emissions of VOC from any portion of the printing, coating or laminating operation other than the drying oven.

8-20-204 Graphic Arts Operation: Any gravure, publication gravure, flexographic printing, screen printing, letterpress, or lithographic printing operation, or any coating or laminating operation manufacturing converted flexible packaging materials for packaging of food or health care products for human or animal consumption.

(Amended December 4, 1985; April 19, 1989; October 6, 1993)

8-20-205 Gravure Printing: An intaglio printing operation in which the ink is transferred from minute etched wells on a plate to the substrate, which is supported by an impression roller, with excess ink removed by a doctor blade.

8-20-206 Deleted October 6, 1993

8-20-207 Non-Porous Substrate: Any substrate whose surface prevents penetration by water, including but not limited to foil, polyethylene, polypropylene, cellophane, paper or paperboard coated with a non-porous surface, metalized polyester, nylon and polyethylene terephthalate (mylar). Clay-coated printing paper as defined by the American Paper Institute Classification System and paperboard coated with clay to prevent water penetration shall be considered a non-porous substrate.

8-20-208 Deleted October 6, 1993

8-20-209 Porous Substrate: A substrate whose surface does not prevent penetration by water, including but not limited to paper, paperboard, and any paper product which is coated with a porous material.

8-20-210 Publication Gravure: Gravure printing on paper which is subsequently formed into books, magazines, catalogues, brochures, directories, newspaper supplements or other types of printed material.

8-20-211 Fountain Solution: The solution applied to the image plate to maintain the hydrophilic properties of the non-image areas and to keep the non-image area free from ink. Isopropyl alcohol, normal propyl alcohol, and/or ethanol are alcohols, which are commonly used as the dampening aid.

(Adopted December 4, 1985)

8-20-212 Letterpress Printing: A method where the image area is raised relative to the non-image area and the ink is transferred to the paper directly from the image surface.

(Adopted December 4, 1985)

8-20-213 Lithographic Printing: A plane-o-graphic method in which the image and non-image areas are on the same plane.

(Adopted December 4, 1985; Amended October 6, 1993)

8-20-214 Screen Printing: A process where the printing ink passes through a web or a fabric to which a refined form of stencil has been applied. The stencil openings determine the form and dimensions of the imprint.

(Adopted December 4, 1985)

8-20-215 Makeup Solvent: That solvent which is added to printing inks to reduce viscosity.

(Adopted April 19, 1989)

8-20-216 Volatile Organic Compounds: Any organic compound (excluding methane, carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates and ammonium carbonate) which would be emitted during use, application, curing or drying of a solvent or surface coating.

- 216.2 Effective January 1, 1995, for the purpose of calculating the VOC content of an ink, coating, or adhesive, any water or the following non-precursor organic compounds shall not be considered to be part of the product:
- acetone
 - parachlorobenzotrifluoride (PCBTF)
 - cyclic, branched or linear, completely methylated siloxanes (VMS)
- 216.3 For the purpose of calculating the VOC content of fountain solution, any water shall be considered to be part of the product.
(Adopted April 19, 1989; Amended Oct. 6, 1993, Jun. 15, 1994, Dec. 20, 1995)
- 8-20-217 Graphic Arts Line:** Printing application equipment, coating equipment, laminating equipment, flash-off areas, ovens, conveyors or other equipment operating in an uninterrupted series in a graphic arts operation. (Adopted April 19, 1989)
- 8-20-218 Non-HeatSet Ink:** An ink which dries by oxidation and absorption into the substrate without the use of heat from dryers or ovens. (Adopted April 19, 1989)
- 8-20-219 Extreme Performance Ink/Coating:** For the purposes of this Rule, an ink or coating used in screen printing on a non-porous substrate that is designed to resist or withstand any of the following: more than two years of outdoor exposure; exposure to industrial-grade chemicals, solvents, acids, or detergents, oil products, cosmetics, temperatures exceeding 760°C (1700°F), vacuum forming, embossing or molding.
(Adopted October 6, 1993)
- 8-20-220 Heat Shrinkable Tubing:** Thermoplastic tubing, including but not limited to polyethylene, Kynar and mylar tubing that after printing is exposed to temperatures exceeding 100°C (212°F).
(Adopted October 6, 1993)
- 8-20-221 Metallic Ink:** An ink that contains greater than 50 grams of metal per liter (0.4 lb/gal) of ink.
(Adopted October 6, 1993)
- 8-20-222 Sign Ink/Coating:** An ink or coating used in screen printing indoor and outdoor signs (excluding structural components) and murals, including lettering enamels, poster colors, copy blockers, and bulletin enamels.
(Adopted October 6, 1993)
- 8-20-223 Solvent:** Organic compounds which are used as diluents, thinners, dissolvers, viscosity reducers, cleaning agents or for other similar uses.
(Adopted October 6, 1993)
- 8-20-224 Water Slide Decal:** A decal which is screen printed onto treated paper stock and is removable from the stock by the dissolution of an underlying, water-soluble adhesive or a similar carrier.
(Adopted October 6, 1993)
- 8-20-225 Web Splicing Adhesive:** An adhesive used to join two continuous rolls of substrate.
(Adopted October 6, 1993)
- 8-20-226 Key System Operating Parameter:** An emission control system operating parameter, such as temperature, flow rate or pressure, that ensures operation of the abatement equipment within manufacturer specifications and compliance with the standards in Section 8-20-301.2, and 308.
(Adopted June 15, 1994)
- 8-20-227 Alcohol Substitute:** Nonalcohol dampening aids that replace or minimize the amount of alcohol used in fountain solutions. These alcohol replacements or substitutes are made up of glycol, such as ethylene glycol, glycol ethers or cellosolve ethers, or proprietary compounds, and are chemically similar to alcohol.
- 8-20-228 Blanket and Roller Washes:** Cleaning products which are used to wash the blankets, the rollers, and the exterior surfaces of the printing press to remove excess printing inks, oils, and paper pieces.
- 8-20-229 Metering Roller Cleaner:** Cleaning products which are used to wash the metering rollers of the printing press to remove excess printing inks and oils.
- 8-20-230 Plate Cleaner:** Cleaning products which are used to wash the printing plates of the printing press to remove excess printing inks and oils.
- 8-20-231 VOC Composite Partial Pressure:** Sum of the partial pressures of the compounds defined as VOCs.
- 8-20-300 STANDARDS**

- 8-20-301 Publication Gravure Requirements:** A person shall not operate a publication gravure process unless one or more of the following conditions is satisfied:
- 301.1 The process uses ink and coating that contains less than 300 grams VOC per liter of product, less water, or
 - 301.2 Emissions of VOC from the printing and drying operation are controlled by an emission control system that meets the requirements of Regulation 2, Rule 1, and which has an overall collection and control efficiency of at least 85 percent on a mass basis. (Amended April 19, 1989; October 6, 1993)

- 8-20-302 Flexographic, Gravure, Letterpress, and Lithographic Requirements:** Except as provided in Section 8-20-308, a person shall not operate a flexographic, gravure, letterpress, lithographic, related printing or coating operation unless the following product limits, expressed in grams VOC per liter of product as applied (pounds per gallon), less water, or percent VOC by volume are met:

<u>Product Limits</u>		
grams VOC per liter of product as applied, less water (lbs/gal)		
	<u>Effective</u> <u>4/19/89</u>	<u>Effective</u> <u>4/1/95</u>
Ink	300 (2.5)	300 (2.5)
Coating	300 (2.5)	300 (2.5)
Adhesive	300 (2.5)	150 (1.25)
Web Splicing Adhesive	300 (2.5)	300 (2.5)

<u>Product Limit</u>			
percent VOC by volume			
	<u>Effective</u> <u>4/19/89</u>	<u>Effective</u> <u>1/1/95</u>	<u>-Effective</u> <u>1/1/97</u>
Fountain Solution	—15	—10	8
<u>Fountain Solution (using alcohol</u> <u>substitute) [Effective 7/1/99]</u>			<u>6</u>

(Amended October 6, 1993, June 15, 1994)

- 8-20-303 Deleted April 19, 1989**

- 8-20-304 Alternate Emission Control Plan:** The requirements of Sections 8-20-301 and 8-20-302 shall not apply to any graphic arts operation or group of such operations which comply with an alternative emission control plan that satisfies all the following requirements:

- 304.1 For plans submitted prior to May 26, 1988, emissions of VOC, on a daily weighted average, shall be no greater than that amount which would result if the affected graphic arts line or lines complied with all applicable requirements of Sections 8-20-301 and 302. Averaging shall be performed using pounds of VOC emitted per gallon of solids applied. The VOC content of the ink, coating, adhesive or fountain solution is as applied including any solvent added before or during application.
- 304.2 The plan shall include methods acceptable for demonstrating compliance with the plan on a daily basis. The information shall be available for inspection by the APCO for each production day at the time of inspection. Such demonstration shall include the following information:
 - 2.1 List of products included in the plan
 - 2.2 Type of inks, coatings or adhesives which will be applied on each product
 - 2.3 Amount of ink, coatings or adhesives applied on each product
 - 2.4 Solids content for each ink, coating or adhesive
 - 2.5 VOC content per gallon or liter of solids, as applied, for each ink, coating or adhesive
 - 2.6 Detailed description of how compliance with Section 8-20-304.1 or Section 8-20-304.7.2, where applicable, shall be achieved
- 304.3 The person submitting the plan shall maintain such records and submit such information on usage and composition, laboratory analysis, source tests or other information as required by the APCO to determine compliance with the plan.

- 304.4 The plan shall contain credit only for reductions achieved on sources subject to the applicable sections of this Rule. Credit shall not be granted for periods of non-operation, for reductions in surface preparation or cleanup solvent, for coatings exempt from the standards in Section 8-20-301 and 302, nor for emission reductions required by other regulations of this District.
- 304.5 If any District regulation is adopted or amended after approval of the plan which requires emissions reductions that are included in the plan, a new plan shall be submitted which does not include credit for those reductions.
- 304.6 The plan shall be submitted to the APCO for review and approval on an annual basis. Submission of the plan shall be within 60 days prior to annual permit renewal. Approval of the plan shall include a 30-day public comment period.
- 304.7 For alternate emission control plans submitted on or after May 26, 1988, the following additional requirements shall be satisfied:
- 7.1 Emissions of VOC on a daily basis shall not exceed the maximum daily emission limit as specified in subsection 8-20-304.7.2.
 - 7.2 For the purpose of determining the maximum daily emission limit, the plan shall include a 20 percent net reduction beyond a baseline as calculated in subsection 8-20-304.7.3.
 - 7.3 Baseline emissions shall be calculated as follows:

$$\text{Baseline emissions} = E \times P \times U$$
 where
 E = the lower of the actual or allowable pounds of VOC at the time of submission of the plan per pound of solids applied.
 P = the arithmetic average of the lower of the actual or allowable hours of operation per day for the prior two years or two other years if it can be shown to the satisfaction of the APCO that the prior two years are not representative.
 U = the lower of the actual or allowable pounds of solids per unit of production times units of production per day.
 Allowable emissions shall be those which would meet the limits specified in Section 8-20-301 and 302, expressed as a solids applied basis.
 - 7.4 The plan submitted pursuant to subsection 8-20-304.2 shall additionally include units of production per hour or per production run and hours of operation or production runs per day to demonstrate compliance with the plan on a daily basis.
 - 7.5 Emissions reductions achieved as a result of compliance with subsection 304.7.2 shall not be deposited into an emissions trading bank. The plan may not take credit for emissions banked as the result of a shutdown.
- (Amended October 6, 1993)
- 7.6 Emissions reductions from an air pollution abatement device may not be used to generate credit toward an alternate emissions control plan where the installation of the device was necessary to comply with Sections 8-20-301 or 302.
 - 7.7 Each renewal of a plan shall maintain the maximum daily emission limit established at the time of initial approval of the plan as specified in subsection 8-20-304.7.1. A recalculation of baseline emissions and a 20 percent net reduction as specified in subsections 8-20-304.7.2 and 304.7.3 shall not be required for each plan renewal. Any modification of the provisions of the plan shall constitute a new plan.
 - 7.8 The requirements of subsections 8-20-304.7.1, 304.7.2 and 304.7.3 shall not apply to any plan submitted where the provisions of the plan are limited to coatings applied at a single source subject to the same emission limitation during a single production run. Allowable emissions shall be those specified in subsection 8-20-304.1.
 - 7.9 The provisions of subsection 8-20-304.7 shall be submitted to the Environmental Protection Agency (EPA) as a source-specific revision

to the State Implementation Plan (SIP). Sources which obtain an approved alternate emission control plan pursuant to the provisions of subsection 8-20-304.7 remain subject to federal enforcement of existing SIP limits pending federal approval of the plan as a source-specific SIP revision.

304.8 Failure to comply with any provision of an approved plan shall constitute a violation of this Rule. (Amended September 20, 1989; October 6, 1993)

8-20-305 Deleted April 19, 1989

8-20-306 Compliance Statement Requirement: The manufacturer of all inks, coatings, adhesives, and fountain solutions which are sold for use in graphic arts operation within the District shall include a designation of VOC of product, less water, as supplied (as defined in Section 8-20-216) expressed in grams per liter or pounds per gallon, either by calculation or analysis, on data sheets.

(Adopted April 19, 1989; Amended October 6, 1993)

8-20-307 Screen Printing Requirements: Except as provided in Section 8-20-308, a person shall not operate a screen printing operation unless the following product limits, expressed in grams VOC per liter (pounds per gallon) as applied, less water, are met:

	Product Limit	
	grams per liter VOC as applied, less water (lbs/gal)	
	Effective 10/6/93	Effective 1/1/97
Ink	400 (3.3)	400 (3.3)
Coating	400 (3.3)	400 (3.3)
Adhesive	300 (2.5)	150 (1.25)
Extreme Performance Ink/Coating	800 (6.7)	400 (3.3)
Metallic Ink	600 (5.0)	400 (3.3)
Sign Ink/Coating	500 (4.1)	400 (3.3)

(Adopted October 6, 1993)

8-20-308 Approved Emission Control System Requirements: The limits of Section 8-20-302 or 307 shall not apply when emissions of VOC to the atmosphere from the printing, coating or laminating and drying operations are controlled by an emission control system that meets the requirements of Regulation 2, Rule 1, and has a collection and control efficiency of at least 75 percent overall on a mass basis.

(Adopted October 6, 1993)

8-20-309 Cleaning Solvent Requirements: Effective July 1, 1999, except as provided in Section 8-20-308, a person shall not use cleaning products containing VOC's for the cleanup of equipment used in graphic arts printing and coating operations, unless at least one of the following product limits is met:

309.1 VOC Content, as applied, less than 300 grams per liter (2.5 lbs/gallon)

309.2 VOC Composite Vapor Pressure, expressed in mm Hg at 20°C, for:

Blanket and Roller Wash	5
Metering Roller Cleaner	15
Plate Cleaner	25

8-20-320 Solvent Evaporative Loss Minimization: The requirements of this Section shall apply to any person using solvent for surface preparation and cleanup and to any person using, mixing, storing, or disposing of ink, coating or adhesive :

320.1 A person shall not use open containers for the storage or disposal of cloth or paper impregnated with organic compounds that is used for surface preparation, cleanup or ink, coating or adhesive removal.

320.2 A person shall not store spent or fresh organic compounds to be used for surface preparation, cleanup or ink, coating, or adhesive removal in open containers.

320.3 A person shall not leave containers or ink, coating, adhesive or fountain solution open when not in use.

(Adopted April 19, 1989; Amended and Renumbered October 6, 1993)

8-20-321 **Prohibition of Sale:** Effective July 1, 1999, except as provided in Section 8-20-119, no person shall sell, or offer for sale any ink, fountain solution, and cleaning product that does not meet the VOC limits as specified in Section 8-20-301, 302, and 307 to any graphics art printing and coating facility in the District.

8-20-400 ADMINISTRATIVE REQUIREMENTS

8-20-401 Deleted April 19, 1989

8-20-402 Deleted April 19, 1989

8-20-403 Deleted April 19, 1989

8-20-404 Deleted April 19, 1989

8-20-405 Deleted April 19, 1989

8-20-406 Compliance Schedule, Loss of Exemption: Any person who becomes subject to the requirements of Sections 301, 302, or 307 through loss of exemption in Section 110 shall comply with the following increment of progress:

406.1 By January 1, 1995, be in full compliance with the requirements of this Rule.
(Adopted April 19, 1989; Amended October 6, 1993)

8-20-500 MONITORING AND RECORDS

8-20-501 Deleted April 19, 1989

8-20-502 Deleted April 19, 1989

8-20-503 Records: Any person complying with the requirements of Sections 8-20-111, 118, 301.1, 302, ~~or 307~~ or 309 shall:

503.1 Maintain a current list of inks, coatings, adhesives, fountain solutions and makeup and cleaning solvents in use which states the VOC content of each.

503.2 Record on a monthly basis the type and amount of all ink, using one of the following methods:

2.1 Group the quantity of all inks used and identify the maximum VOC content and use the minimum density of 1.01 kg/l (8.44lb/gal).

2.2 Report process inks and pantone colors separately and use the specific VOC content and density value for each process ink and the highest volatile organic compound and 1.01 kg/l (8.44 lbs/gal) for pantone inks; or

2.3 Report process inks and pantone colors separately using the maximum VOC content and minimum density for both process and pantone inks or use the density of 1.01 kg/l (8.44 lbs/gal) for pantone inks.

2.4 Itemize each ink and pantone color and use the specific VOC content and density value for each.
(Adopted October 6, 1993)

503.3 Record on a monthly basis the type and amount of each coating, adhesive, fountain solution and makeup, surface preparation, and cleanup solvent used.

503.4 Retain and have such records available for inspection by the APCO for the previous 24-month period.

(Adopted April 19, 1989; Amended October 6, 1993; June 15, 1994)

8-20-504 Deleted October 6, 1993

8-20-505 Emission Control System Monitoring: Effective September 1, 1989, any person who uses an emission control system which is subject to the provisions of Sections 8-20-301.2, 301.3, 304, and 308 shall install a readily visible temperature gauge which monitors the operating temperature of the emission control system at all times during operation.

(Adopted April 19, 1989; Amended September 20, 1989; October 6, 1993)

8-20-506 Emission Control System, Recordkeeping Requirements: Any person subject to Sections 8-20-301.2 and 308 shall:

506.1 Maintain a current list of inks, coatings, adhesives, fountain solutions and makeup solvent in use which states the VOC content of each.

- 506.2 Record on a daily basis the type and amount of all ink, coating, adhesive, fountain solution and makeup, surface preparation and cleanup solvent used.
- 506.3 Record key system operating parameters, as defined in Section 8-20-226, on a daily basis.
- 506.4 Retain and have such records available for inspection by the APCO for the previous 24-month period. (Adopted October 6, 1993; June 15, 1994)

8-20-507 Burden of Proof: Any person claiming the small user exemption per Section 8-20-110 must have information available, such as purchase orders or hazardous waste manifests, that would allow the APCO to verify facility usage.
(Adopted October 6, 1993)

8-20-600 MANUAL OF PROCEDURES

8-20-601 Analysis of Samples: Samples of products specified in Sections 8-20-301, 302, and 307 shall be analyzed as prescribed in the Manual of Procedures, Volume III, Methods 21 or 22, or EPA Methods 24 and 24A to determine VOC content.
(Amended October 6, 1993)

8-20-602 Determination of Emissions: Emissions of volatile organic compounds as specified in Sections 8-20-110, 111, 301, 308, and subsection 8-20-304.3 shall be measured as prescribed by any of the following methods: 1) BAAQMD Manual of Procedures, Volume IV, ST-7, 2) EPA Method 25 or 25A. When either EPA Method 25 or 25A is used, control device equivalency shall be determined as prescribed in 55 FR 26865 (June 29, 1990). A source shall be considered in violation if the VOC emissions measured by any of the referenced test methods exceed the standards of this rule. When determining emissions of VOC for lithographic printing facilities, the following substrate retention factors of VOC for inks will be applied: 20 percent retention of the VOC content for heatset inks and 95 percent retention of the VOC content for non-heatset inks, based on the VOC content as determined by Section 8-20-601.
(Amended April 19, 1989; September 20, 1989; October 6, 1993; June 15, 1994)

8-20-603 Deleted October 6, 1993

8-20-604 Determination of VOC Composite Partial Pressure: The identity and quantity of components in solvents shall be determined by gas chromatography. The VOC composite partial pressure is calculated as follows:

$$PP_c = \frac{\sum_{i=1}^n (W_i)(VP_i)/(MW_i)}{(W_w/MW_w) + (W_e/MW_e) + \sum_{i=1}^n (W_i/MW_i)}$$

where: W_i = Weight of the "i" th VOC compound, in grams

W_w = Weight of water in grams

W_e = Weight of exempt compound, in grams

MW_i = Molecular weight of the "i" th VOC compound, in grams per gram-mole

MW_e = Molecular weight of exempt compound, in grams per gram-mole

PP_c = VOC composite partial pressure at 20°C, mm Hg

VP_i = Vapor pressure of the "i" th the VOC compound at 20°C, in mm Hg